

Abstract

In accordance with the invention, a variable delay line with continuous tuning comprises an optical path providing at least one continuous delay element coupled to a series of switchable binary fixed delays. The series of switchable delays can be configured to select a delay among a plurality of incremental delays, and the continuous delay can set a continuous delay in a range encompassing the delay increment of the binary series. In a preferred embodiment, the variable delay element comprises a tunable all pass filter (APF) with delay tunable from essentially 0 to a time T and the switchable binary fixed delays form a series (0,T), (0, 2T), (0, 4T), ..., [0, (2n + 1)T], where n is an integer ≥ 0 . The switches are preferably Mach-Zehnder switches. In an alternative embodiment, the continuous delay element comprises a suitable pair of APF arms. The path and all components can be fabricated as an integrated planar waveguide (solid state) device.